Advanced Mechanics of Materials

Advanced Mechanics of Materials

Objective of the Course

To provide the foundation for the mechanics of deformable solids.

Class Hours and Schedule

Monday , Wednesday 11:00 - 12:15
Reading days - Oct. 11 - 14 ; Last class - Dec. 10
Final Exams - Dec. 15 - 22

Advanced Mechanics of Materials

Consultation

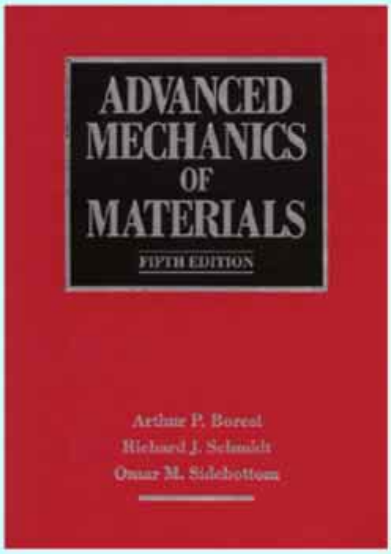
By phone: 757/864-1978, Monday 4:00-5:00 p.m.

URL Address for the Course Web Page

(Screen shots of class presentations and assignments)
http://actuva-www.larc.nasa.gov/wbi-tools.htm

Recommended References

1. Boresi, A. P., Schmidt, R. J. and Sidebottom, O. M., Advanced Mechanics of Materials, fifth ed., Wiley, 1993



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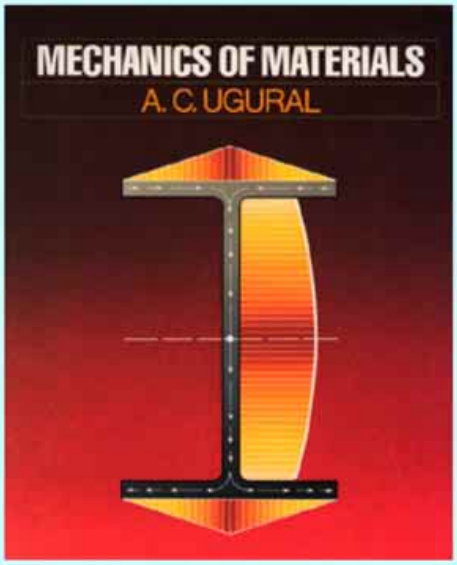

2. Ugural, A. C. and Fenster, S. K., Advanced Strength and Applied Elasticity, 3rd ed., PTR Prentice Hall, 1995

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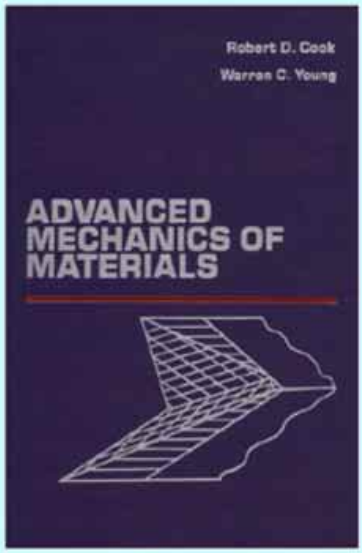

3. Cook, R. D. and Young, W. C., Advanced Mechanics of Materials, Macmillan, 1985

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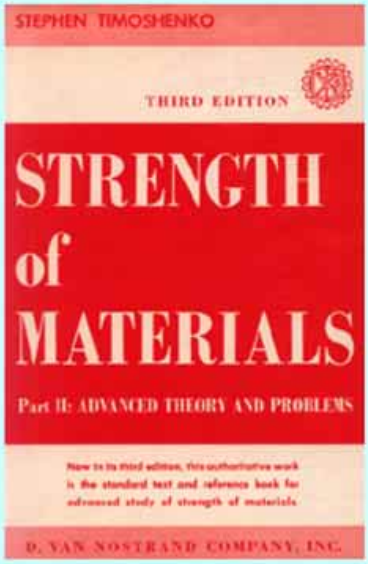

4. Timoshenko, S., Strength of Materials, Part II, D. Van Nostrand, 1956

Recommended References

5. Oden, J. T. and Ripperger, E. A., Mechanics of Elastic Structures, McGraw Hill, 1981

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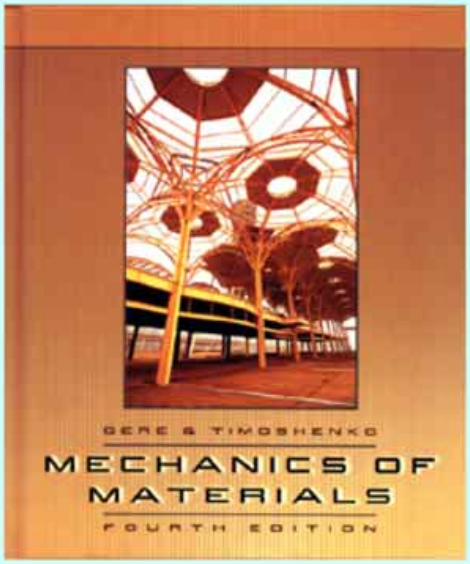

6. Gere, J. M. and Timoshenko, S. P., Mechanics of Materials, 4th ed., PWS Publishing Company, 1997

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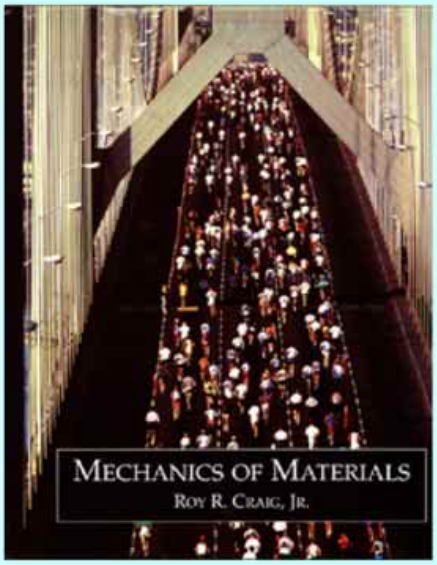

7. Craig, R. R., Jr., Mechanics of Materials, John Wiley & Sons, 1996

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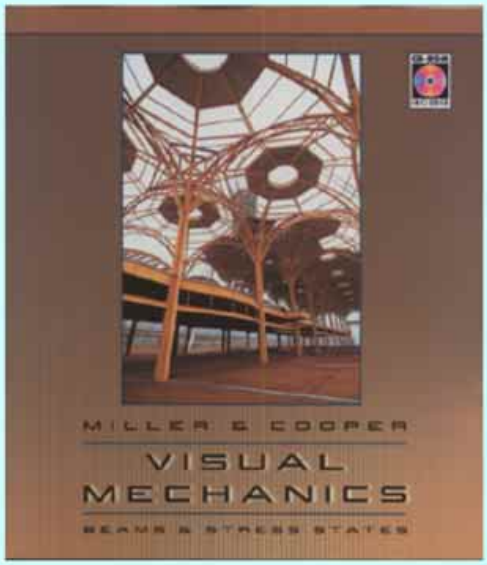

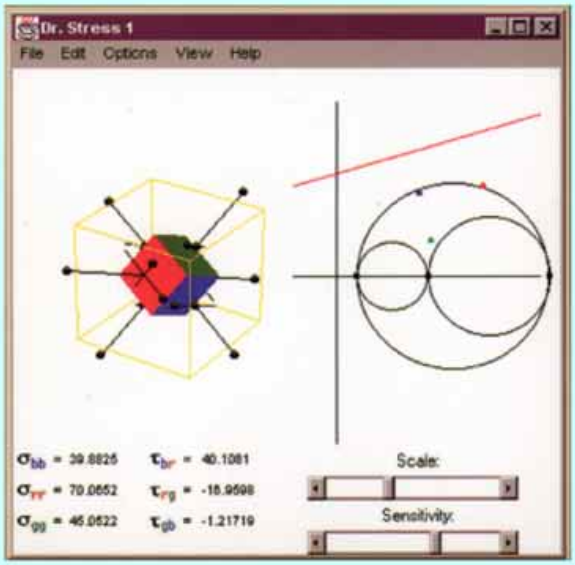

Screen Shots of Software

8. Miller, G. R. and Cooper, S.C., Visual Mechanics, 1998

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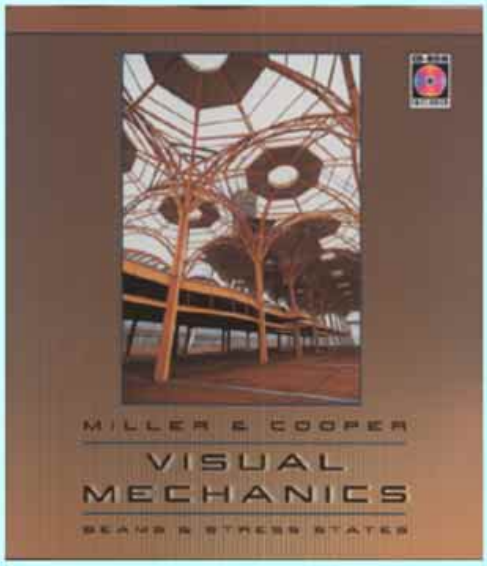

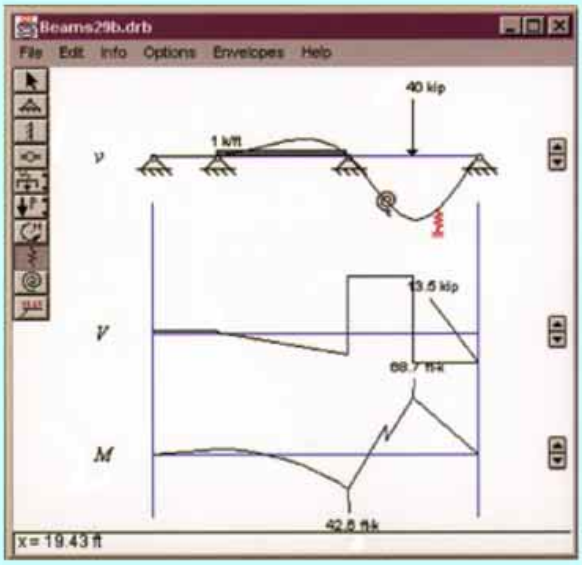

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4. Timoshenko, S., Strength of Materials, Part II, D. Van Nostrand, 1956
5. Oden, J. T. and Ripperger, E. A., Mechanics of Elastic Structures, McGraw Hill, 1981
6. Gere, J. M. and Timoshenko, S. P., Mechanics of Materials, 4th ed., PWS Publishing Company, 1997
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8. Miller, G. R. and Cooper, S.C., Visual Mechanics, 1998

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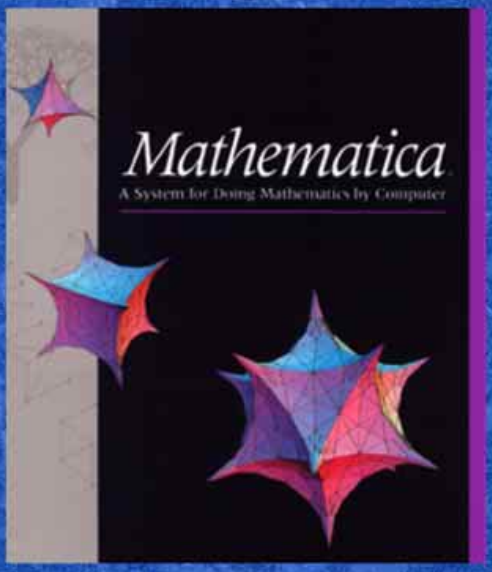
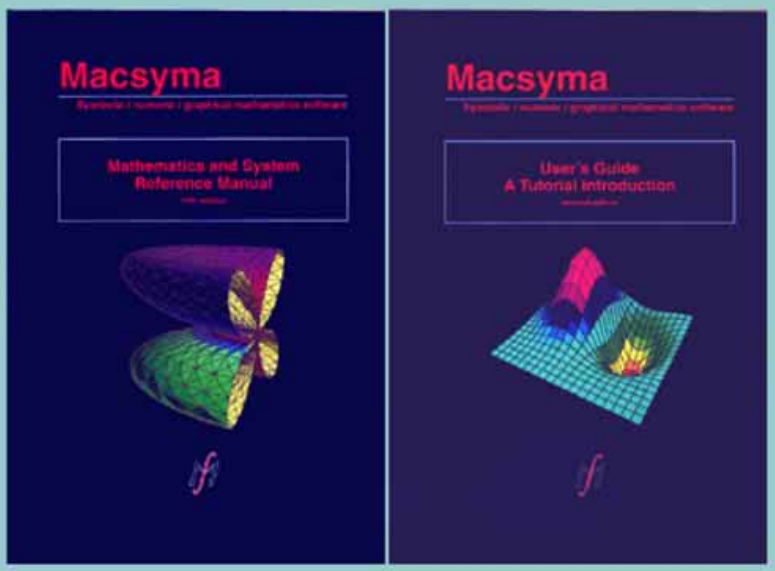
Recommended Computer Software

1. MATHEMATICA



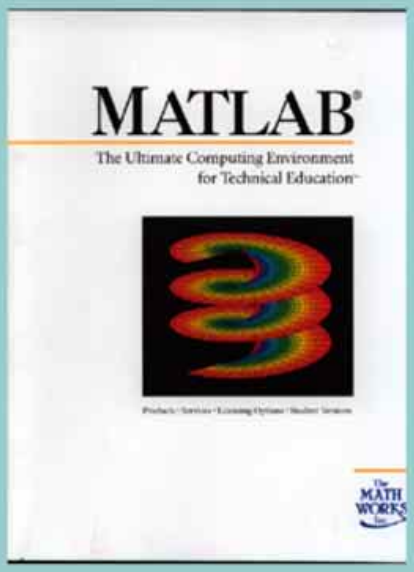
Recommended Computer Software

2. MACSYMA



Recommended Computer Software

3. MATLAB



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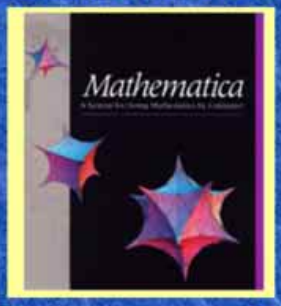
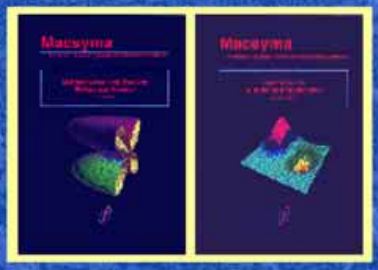


2. MACSYMA



3. MATLAB

4. ANSYS/PC

5. MSC NASTRAN Windows

Advanced Mechanics of Materials

Course will emphasize

- WHAT are the basic theories and techniques of mechanics of materials - with emphasis on underlying principles and limitations?
- WHAT can they do?
- HOW will they do it?

Advanced Mechanics of Materials

Prerequisites:

- Basic (undergraduate) course in strength of materials (or solid mechanics)
- Knowledge of matrix notation and matrix manipulations

Advanced Mechanics of Materials

Matrix Notation:

- Introduce exceptional conciseness and transparency of the mathematics
- Simplify the calculations and allow systematic development of concepts

Advanced Mechanics of Materials

Grade Based on:

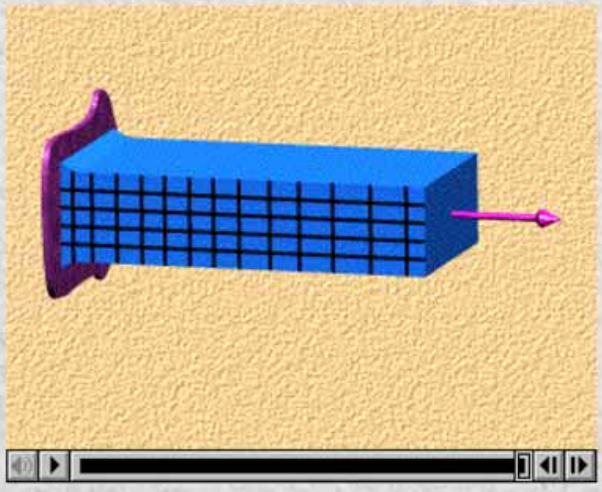
- Assignments (homework)
- Final exam (take-home exam)
- Honor system

Course Outline

1. Introduction and definitions
2. Kinetics, kinematics of deformation and constitutive relations
3. Failure theories
4. Symmetrical and unsymmetrical beam bending
5. Shear stresses and shear flow
6. Torsion of bars
7. Stability of beams
8. Beams on elastic foundations
9. Curved beams

Course Outline

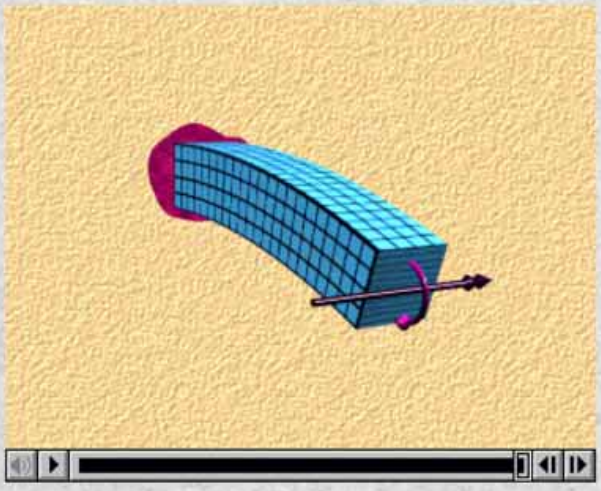
1. Introduction and definitions



Axial Loading

Course Outline

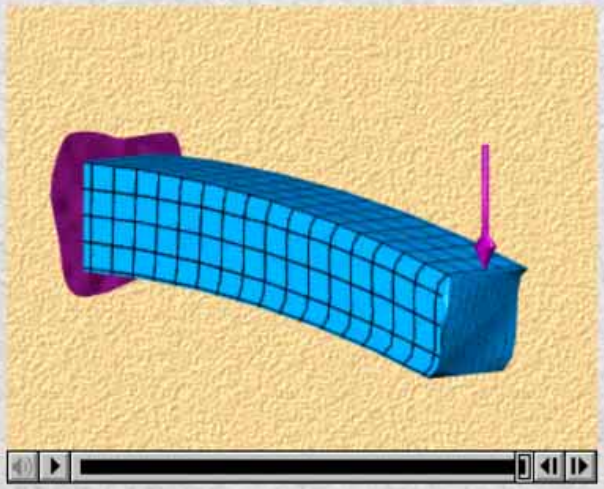
1 Introduction and definitions



Pure Bending

Course Outline

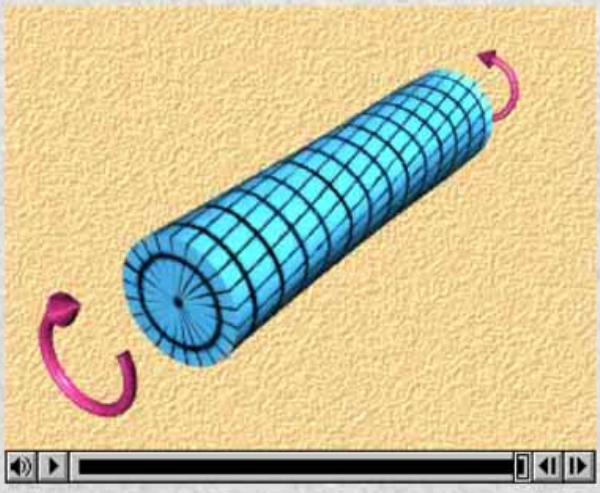
1 Introduction and definitions



Transverse Bending

Course Outline

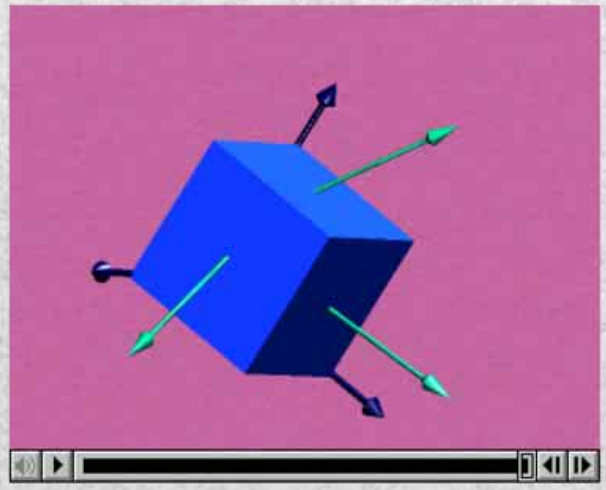
1. Introduction and definitions



Torsion of Circular Bars

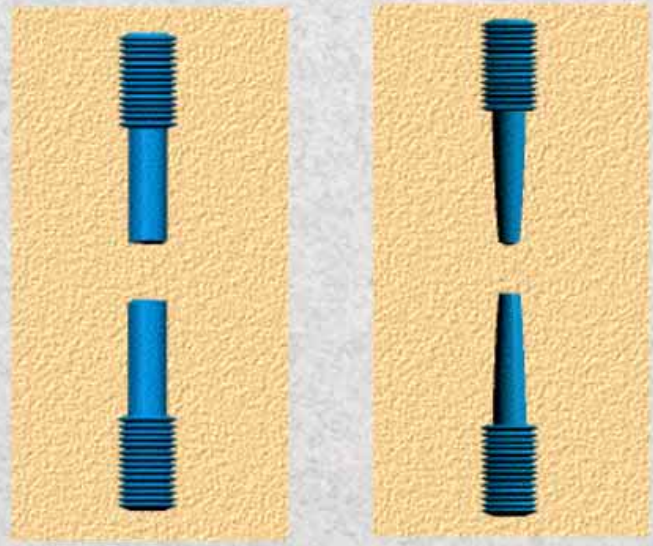
Course Outline

2. Kinetics, kinematics of deformation and constitutive relations



Course Outline

3 Failure theories



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Brittle Ductile

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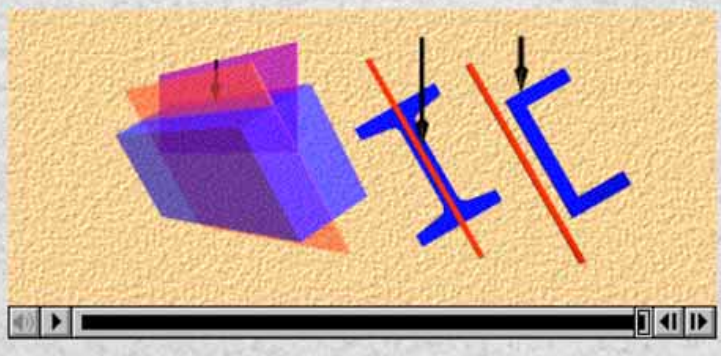
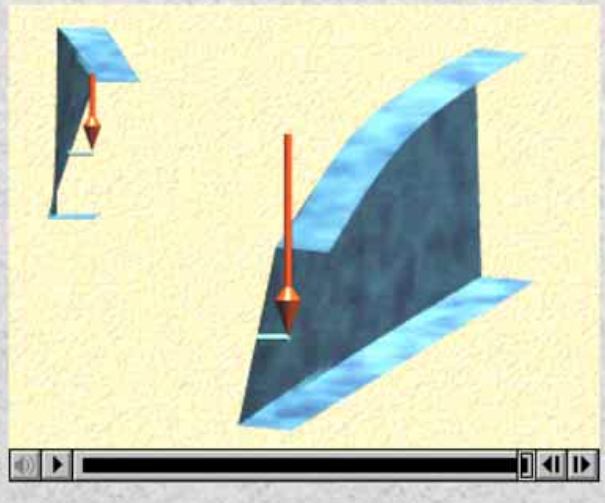
Course Outline

4 Symmetrical and unsymmetrical beam bending



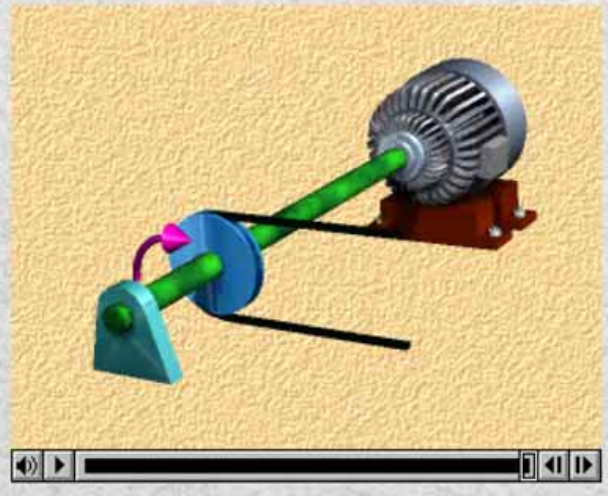
Course Outline

5 Shear stresses and shear flow



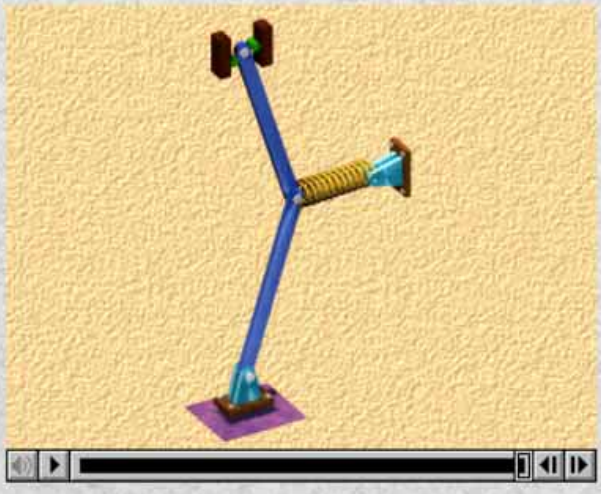
Course Outline

6 Torsion of bars



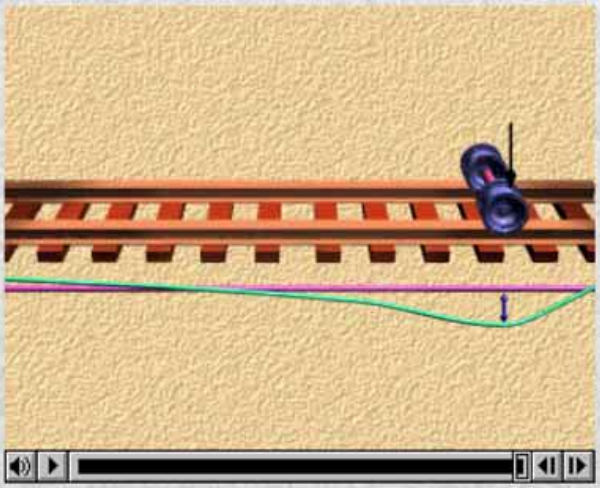
Course Outline

7 Stability of beams



Course Outline

8 Beams on elastic foundations



Course Outline

9 Curved beams